The restricted possibilities of optical illustration for three-dimensional image data firstly complicate the orientation in the objects displayed, since the viewer does not have immediate access to the depth information nor, in association therewith, to navigation within the data. This problem likewise arises in viewing, for example in diagnostic evaluation, as in the case of production, for example in three-dimensional construction.

Methods that use a rotating MIP of a functional data record for navigation exist in medical diagnostics. The disadvantage in this is that the anatomical assignment is thereby not yet always unique, for example when two hot spots lie very tightly next to one another. Consequently, these methods require a procedure in two stages, which is therefore troublesome: firstly, a slice plane through the hot spot of interest is laid on the rotating MIP (one-dimensional information), and then this slice must additionally be displayed and the position of the hot spot therein must be determined. Not until then is the three-dimensional information relating to the position available.

Tools for exploring volume data records that comprise two-dimensional and three-dimensional input units are known from the dissertation entitled **"3D-EXPLORATION VON VOLUMENDATEN; Werkzeuge zur interaktiven Erkundung medizinischer Bilddaten" ["THREE-DIMENSIONAL EXPLORATION OF VOLUME DATA; Tools for interactive exploration of medical image data"]**, October 21, 1998, by M. Jahnke. For example, a three-dimensional cursor object is proposed by means of which it is possible to select a partial volume of a volume data record; this partial volume can be understood as a region of interest (ROI) or voxel of interest (VOI). The partial volume selected in such a way can then be further used as an independent viewing volume within which the exploration is continued. A further three-dimensional object proposed there is the

so-called prober, which constitutes a three-dimensional geometric object, for example a cube. The prober can be positioned like a cursor. It serves the purpose of determining scanned values of the volume respectively surrounded by the prober; in the case of a cube, these scanned values can be two-dimensional projections of the volume onto the cube faces. The tools proposed in the work of M. Jahnke in each case serve the manual exploration of partial volumes.

It is known from section 2.3.5 of the master's thesis entitled "A System for Surgical Planning and Guidance using Image Fusion and Interventional MR" by David T. Gering, submitted to the Massachusetts Institute of Technology in December 1999 to click on a point of a first two-dimensional projection from a three-dimensional electronic data record in order respectively to set the center of the first projection and the centers of a second and a third projection having the same orientation as the first projection on the clicked points, the three projections respectively having different magnification factors, as is illustrated in figures 2 to 7 there.

It is the object of the invention to specify a method for navigating in three-dimensional image data records that automates the finding and determination of the three-dimensional position of three-dimensional partial image data records of particular interest, as well as the visualization thereof, and thereby facilitates the same.

The invention achieves this object by means of a method having the features of the first patent claim.

The features of patent claim 1 yield the advantage that a user can use a conventional two-dimensional projection to select a partial image data record of particular interest, and thereby automatically obtains a further projection of the image data record that likewise again includes the partial image data record. The user need not firstly manually produce the further projection in which he lays a slice plane in the original projection. In this sense, the projection of the partial image data record is used, as it were, as an active link that can, for example, be selected by the user with the aid of a mouse or some other pointer unit, that is to say can be clicked on. The production of the tomograms required for identifying and for determining the position of the partial image data record is thereby intuitively configured and simplified.

In an advantageous refinement of the invention, use is made of an image data record that has been formed by fusing at least two source image data records. It is thereby possible to facilitate navigation for a user, particularly in image data records that have an information content extended by the fusion. The extended information content, in turn, can be used precisely for the purpose of automatically identifying partial image data records of possible interest from which the user can then make a manual selection.

Amended patent claim

1. A method for navigating in three-dimensional electronic image data records, the image data records including three-dimensional partial image data records, comprising the method steps of:

- optically displaying at least two, mutually perpendicular two-dimensional projection of an image data record, at least one of the two projections comprising a two-dimensional partial projection of at least one partial image data record,
- optically emphasizing the at least one two-dimensional partial projection,
- functionalizing the at least one optically emphasized partial projection in such a way that the latter can be selected by a user input,
- receiving a user input directed toward the selection of at least one partial projection functionalized in such a way,
- automatically displacing as a function of the user input the at least one projection not comprising the at least one partial projection in such a way that it comprises the partial projection after the displacement.

Amended patent claims (April 18, 2005)

1. A method for navigating in three-dimensional electronic image data records, the image data records including three-dimensional partial image data records, comprising the method steps of:

- optically displaying at least one two-dimensional projection of a first image data record that comprises a two-dimensional partial projection of at least one partial image data record present,
- optically displaying at least one further two-dimensional projection of a second image data record, which differs from the first one and comprises a two-dimensional partial projection of at least one partial image data record present,
- optically emphasizing at least one two-dimensional partial projection,
- functionalizing the at least one optically emphasized partial projection in such a way that the latter can be selected by a user input,
- receiving a user input directed toward the selection of at least one partial projection functionalized in such a way,
- automatically displaying optically as a function of the user input in each case at least one further two-dimensional projection of the first and second image data record, a two-dimensional projection of the selected partial image data record being comprised.

2. The method as claimed in claim 1, characterized in that one of the image data records has been formed by fusing at least two source image data records.

3. The method as claimed in claim 2, characterized in that the source image data records comprise a source image

data record obtained from a computed tomography method, and a source image data record obtained from a positron emission tomography method.

4. A computer program product that facilitates executing or installing the method as claimed in one of the preceding claims on a computer.